

SOME RECENT RESULTS IN COMPETING RISKS THEORY

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1. Introduction

The problems of competing risks and complementary risks arise quite naturally in a number of contexts, particularly in problems of survival analysis and reliability theory. The problems, in their simplest form, may be described as follows. Let X_i be a random variable with cumulative distribution function (C.D.F.) $F_i(x)$, ($i=1,2,\dots,p$). We assume that the X_i 's are not observable but $U=\min(X_1,\dots,X_p)$ or $V=\max(X_1,\dots,X_p)$ is. We would like to determine uniquely the marginal C.D.F.'s, F_i 's, from that of U in the competing risks problem or from that of V in the complementary risks problem. We would also consider related inference problems.

As examples of the concepts consider the following:

- (a) Let X_i be the time to death (failure) from cause C_i (of component C_i).

Here X_i 's are not observable but we observe a death time U (or time to series system failure) or a time V at which the last remaining duplicated organ fails (time to failure of a parallel system).

- (b) In survival analysis randomly censored data correspond to the situation when $p=2$, X_1 is the variable of interest and X_2 the censoring variable.